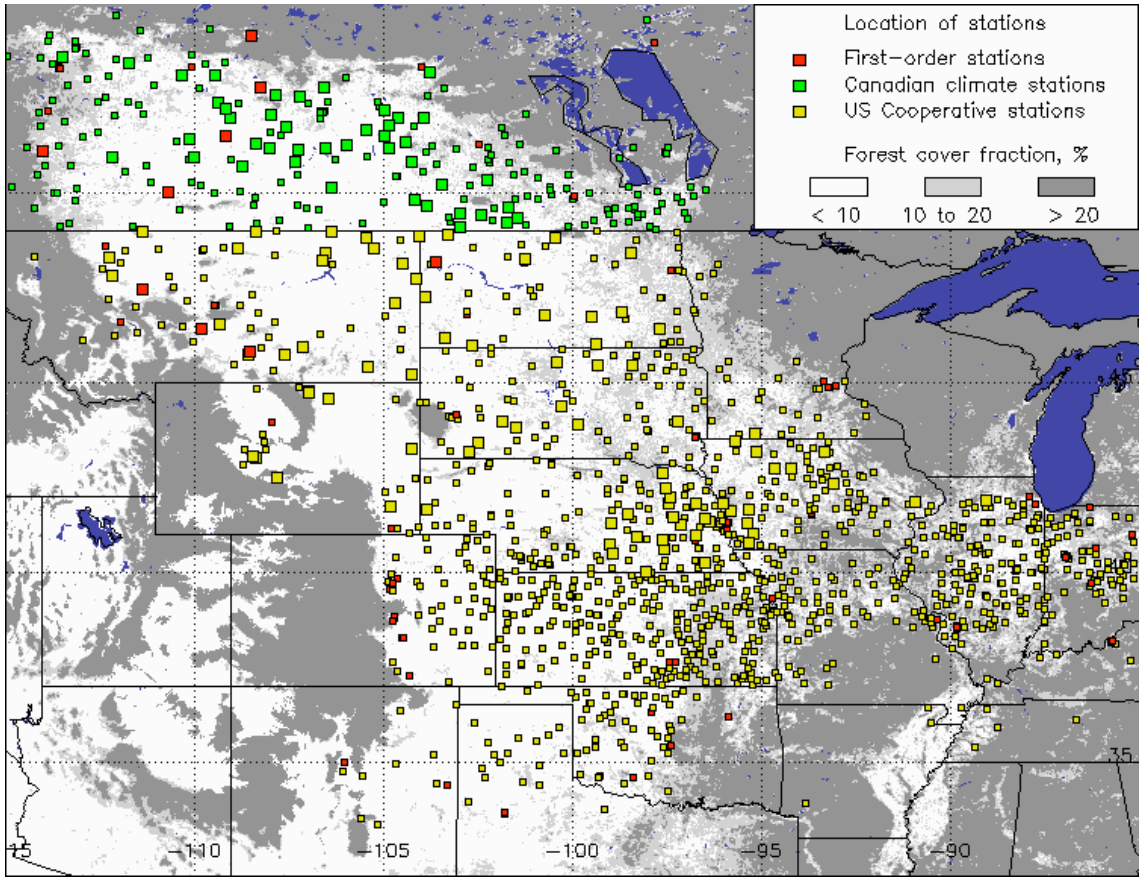
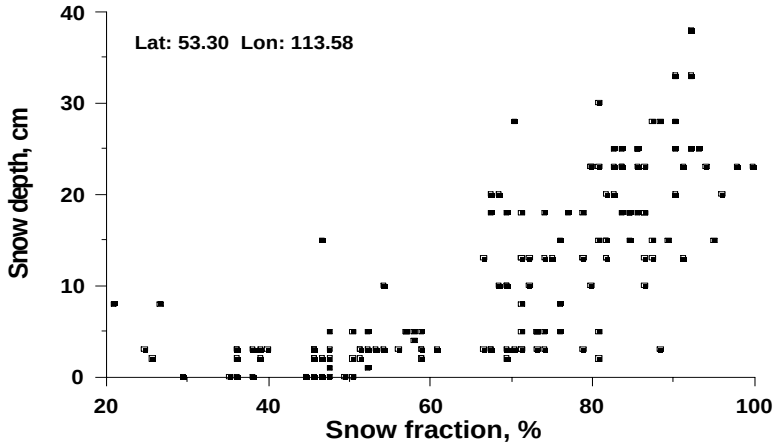
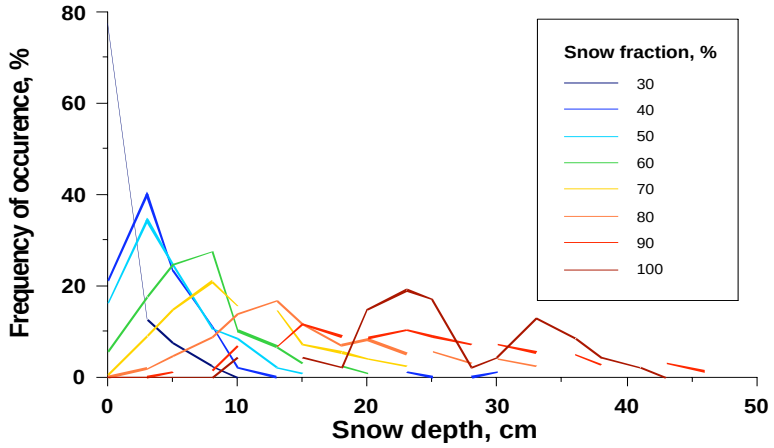


Fig.1. Location of stations used in the study. Large squares represent “primary” locations, which were used to establish the snow fraction-snow depth relationship.



(a)



(b)

Fig.2 (a): Snow fraction vs snow depth statistics for a station located at Edmonton International Airport, 53.30^0N, 113.58^0W. (b): Frequency of occurrence of snow depth, corresponding to a given snow fraction calculated from matched observations over all primary locations.

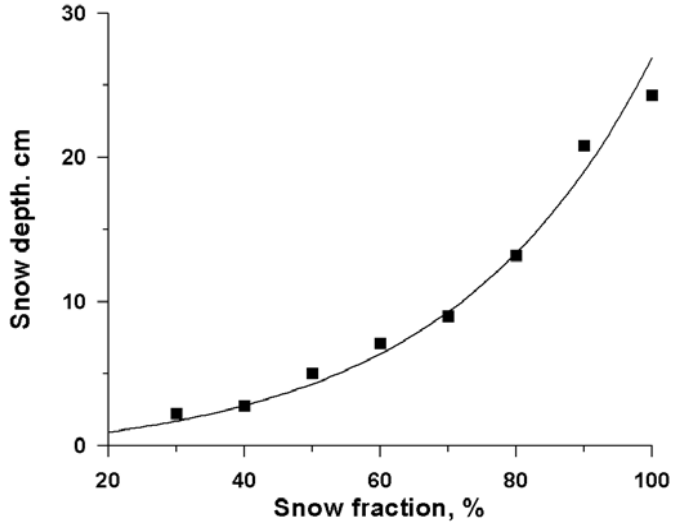


Fig. 3. Snow depth versus the observed snow fraction. Results are averaged over 10% snow fraction bins. The line represents the best fit to the data with a single parameter exponential function: Y=exp(0.0333*X) -1

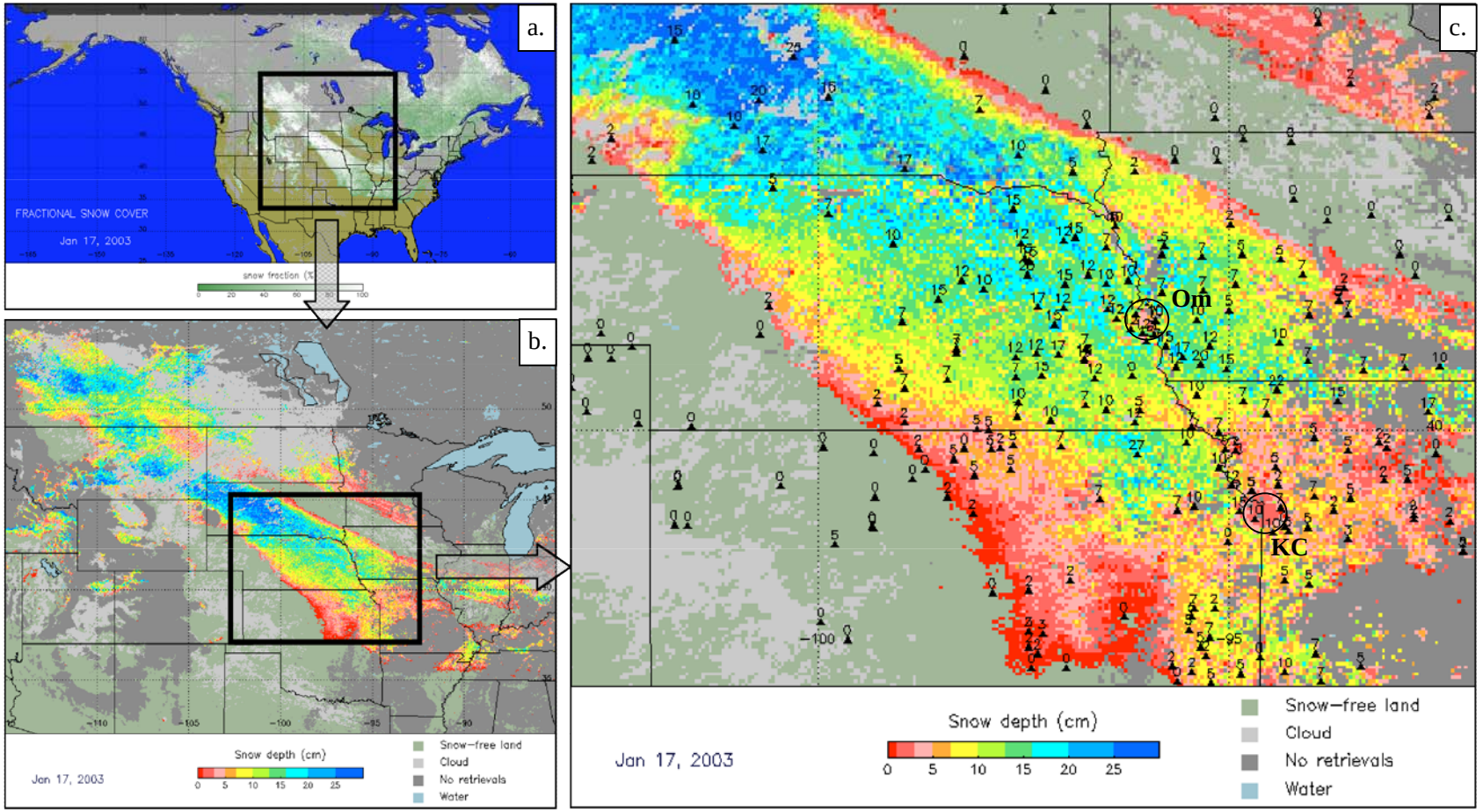
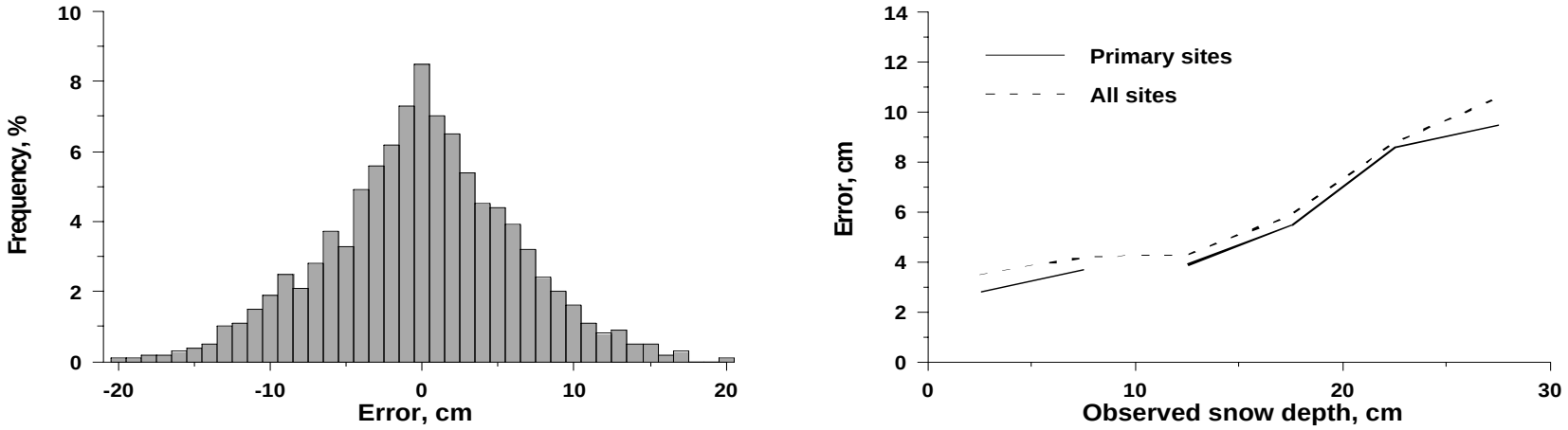
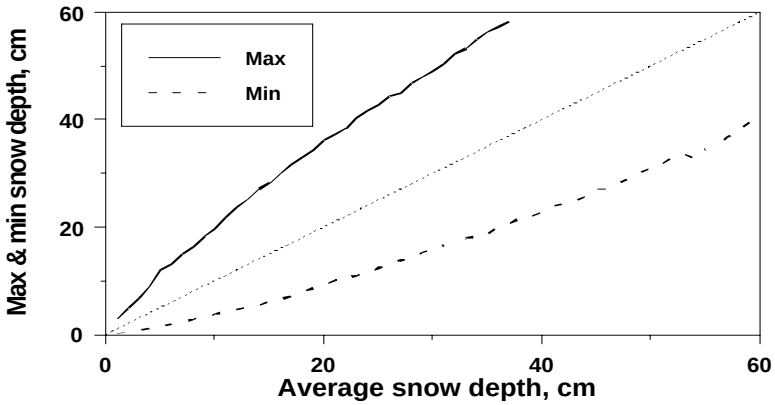


Fig. 4. Snow fraction and snow depth distribution retrieval for January 17, 2003. a: Snow fraction map, gray color indicates cloud cover; b: Map of snow depth over the Great Plains and Canadian Prairies. Light gray indicates cloud cover, dark gray shows areas where snow depth retrieval is not possible; c: Enlarged portion of the snow depth map with overlaid *in situ* snow depth data. Circles labeled as Om and KC identify respectively the location of Omaha, Nebraska and Kanzas City, Missouri.

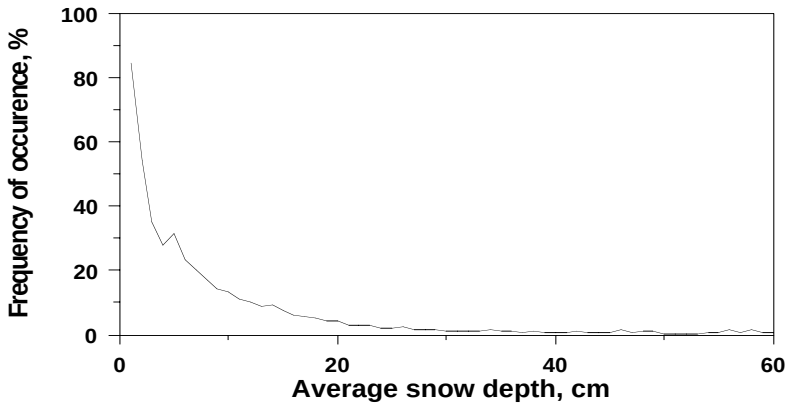


(a) (b)

Fig. 5. Frequency distribution of snow depth retrieval errors (satellite-surface) for primary locations (a) and mean absolute bias of the derived snow depth as a function of the observed snow depth (b).



(a)



(b)

Fig. 6. Results of the statistical analysis of the Former Soviet Union Hydrological Snow Survey data. (a) Average minimum and maximum snow depth in an open (non-forested) area as a function of the average snow depth along the course. (b) Frequency of occurrence of a patchy snow cover as a function of the average snow depth along the snow course.

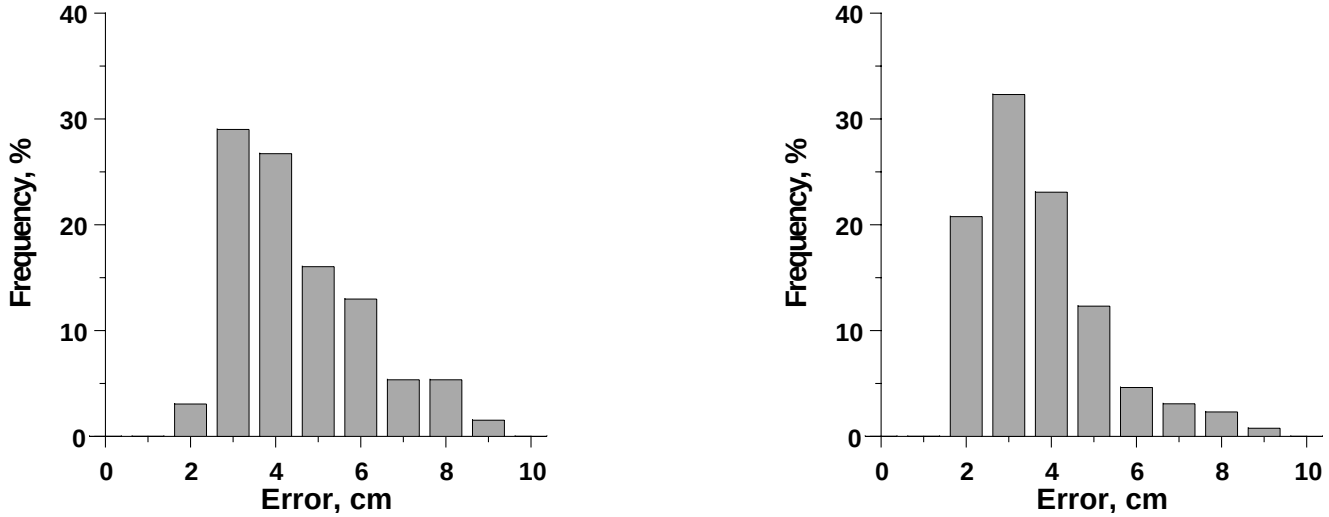


Fig. 7 Frequency distribution of mean absolute snow retrieval errors for primary locations. (a): Retrievals made using Eq. (2) with fixed coefficient *a*; (b) Retrievals made with variable coefficient *a* determined for every location. Corresponding mean absolute retrieval errors are 5.0 cm for (a) and 4.1 cm for (b).